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institutions with which they are connected. The states containing 50 or more of the first thousand leading men of science are in order, New York 183, Massachusetts 165, Maryland (including the District of Columbia) 148, Illinois 77, Pennsylvania 60, California 50, Connecticut 50. The institutions containing 30 or more men of the first thousand are in order, Harvard 79, Columbia 48, Chicago 47, Yale 38, Cornell 35, Johns Hopkins 33, Wisconsin 30. Of the Universities having the strongest departments according to this basis, Harvard has five, standing first, namely, physics, botany, zoology, physiography and pathology. Chicago has two standing first, namely, mathematics and astronomy. Columbia, Johns Hopkins and Massachusetts Institute of Technology each have one department standing first, namely. psychology, anatomy, and chemistry respectively. The six leading universities ranked according to their total scientific strength on this basis are in order, Harvard, Chicago, Columbia, Johns Hopkins, Yale, and Cornell. S.

The opening session of the Minneapolis Meeting of the American Association for the Advancement of Science will be held on Tuesday evening, December 27. The section for Mathematics and Astronomy will begin its sessions the following morning at 10 a. m. The program for all the meetings of the Association is expected to be ready on the opening day. Papers which are to be read before Section A, should reach the Secretary, Professor G. A. Miller, before December 5.

In a recent circular issued by B. G. Teubner, of Leipzig, Germany, it is announced that their supply of the first volume of the German edition of the great mathematical encyclopedia is exhausted and they advise that those interested should secure the corresponding part of the French edition. Thirty-five volumes of the latter are in preparation. They are published in parts of about 160 pages. Fifteen of these relating mainly to arithmetic and algebra have already appeared and seventeen additional parts are said to be now in press.

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BOOKS AND PERIODICALS.

Text Book of Physics. By C. E. Linebarger, Lake View High School, Chicago. 8vo. Cloth, viii+471 pages. Price, $1.50. Boston: D. C. Heath & Co.

In writing an elementary text-book on physics, one is at a loss to know just what to select from the great abundance of important material at one's disposal. In the present text, the author has succeeded very well in selecting from the great wealth of material that which is interesting and important, and his treatment of the subject aims to be "intensive rather than extensive." The definitions are clearly stated, and the principles and laws have been logically established. The illustrations are numerous and true to reality. At the close of each chapter is a list of questions and problems designed to test the student's knowledge of the principles. F.

The Calculus for Beginners. By J. W. Mercer, M. A., Head of the Mathematical Department, Royal Naval Academy, Dartmouth. 8vo, cloth. xiv+440 pp. Price, $2.00. Cambridge, England: The University Press. G. P. Putnam's Sons, New York, American Agents.

The author of this book believes that it is more important for the beginner to understand clearly what the processes of the calculus mean and what the calculus can do for him than a facility in manipulation of the processes and a wide acquaintance with them. So he has written this book with the aim to emphasize the underlying principle of the calculus and impress this principle on the mind of the beginner. He has, therefore, given many pages to the ideas of rates of change and of the limiting value of the ratio of two continually diminishing quantities, and in the various illustrations given it is hoped that the beginner will emerge from darkness into a clear insight of the subject.

The book is intended primarily for those students who are likely to take up engineering, and no great amount of previous mathematical knowledge is assumed.

Many of the illustrations are arithmetical or geometrical and many are drawn from the knowledge at the command of most boys at the age at which they are expected to take up the study of the calculus. F.

The Elements of the Theory of Algebraic Numbers. By Legh Wilber Reid, Professor of Mathematics in Haverford College, with an Introduction by David Hilbert, Professor of Mathematics in the University of Göttingen. Large 8vo, cloth. xv+454 pages. Price, $3.50 net.

From the standpoint of pure mathematics, this is among the most important mathematical works that has thus far been published in America. For, until the publication of this work, the ideas developed could only be read in the German or the French. Very little attention has thus far been given to the study of the theory of Algebraic Numbers. True, courses have been given on the subject in some of our larger Universities, but no productive work of much consequence has thus far resulted. The appearance of this work will, no doubt, stimulate an interest in one of the most abstruse, and at the same time one of the most interesting subjects of pure mathematics.

The author has aimed to lead a reader, entirely unacquainted with the subject, by easy steps, to an appreciation of some of the fundamental conceptions in the general theory. In this respect, we believe that he has succeeded quite well. By a study of this book one may take up and read with better understanding the works on the general theory by such mathematicians as Hilbert, Dedekind, Kronecker, Kummer, and others.

In Hilbert's Preface to his *Die Theorie der Algebraischen Zahlenkorper* is given a brief historic survey of the subject from the time of Gauss down to the closing days of the nineteenth century.

The author of the present work deserves the thanks of the younger mathematicians who,—in view of the *new education* which is now so enthusiastically proclaimed by pedagogic theorists, to the end that no subjects should be required for graduation,—have neglected to study French and German. Not only these and those who shall follow them, but the mature mathematician as well, will welcome this book written by one who has devoted much of his time to a thorough study of a profound subject. F.

Elementary Analysis. By Percy F. Smith, Ph. D., Professor of Mathematics in the Sheffield Scientific School of Yale University, and William Antony Granville, Ph. D., Instructor in Mathematics in the Sheffield Scientific School of Yale University. 12mo, cloth. Illustrated. x+223 pp. Price, $1.50. Boston and Chicago: Ginn & Co.

This book presents a course of seventy lessons in mathematics beyond trigonometry, or in Analytical Geometry and the Calculus.

The first chapter deals with formulas of reference from Algebra and Trigonometry, the second with Cartesian coordinates; the third, with Curve and Equation, and so on subjects are taken up in Analytical Geometry until chapter seven is reached, in which differentiation is taken up. The remainder of the book is devoted to processes in the Calculus.

The authors have endeavored to give in this book as much mathematics as is needed by the average student of the natural and experimental sciences, and no student ought to be graduated from a scientific course of study who is unfamiliar with the mathematics of the text before us. F.

A Class-Book of Trigonometry. By Charles Davison, Sc. D., Mathematical Master at King Edward's High School, Birmingham. 8vo, cloth. viii+200 pp. Price, $1.00. Cambridge, Eng.: The University Press. G. P. Putnam's Sons, New York, American Agents.

The author's aim in preparing this book for public favor has been to reach the solution of the triangle as soon as possible. To this end many details usually found in works on the subject are here omitted. The book is neatly printed and bound, this being in conformity with all work done by the University Press. F.

The Fundamental Theorems of the Differential Calculus. By W. H. Young, Sc. D., F. R. S. Formerly Fellow of Peterhouse, Cambridge, Lecturer on Higher Analysis at the University of Liverpool. 8vo, paper cover. ix+72 pages. Price, 75 Cents. Cambridge, Eng.: Cambridge University Press. G. P. Putnam's Sons, New York, American Agents.

This is No. 11 of the Cambridge Tracts in Mathematics and Mathematical Physics, under the general editorship of J. G. Leahman and E. T. Whittaker.

The author, in this tract, aims rather at rigidity of proof and novelty of treatment than simplicity of presentation. To carry out complete rigor in some of the demonstrations some of the Theory of Sets of Points are introduced.

Teachers of the Calculus who desire a rigorous presentation of the Fundamental Theorems of the Calculus will find this tract very helpful and suggestive. F.

Orders of Infinity. 'The Infinitärcalcül' of Du Bois-Reymond. By G. H. Hardy, M. A., F. R. S. Fellow and Lecturer of Trinity College, Cambridge. 8vo, paper cover. ii+62 pages. Price, 75 Cents. Cambridge: The Cambridge University Press. G. P. Putnam's Sons, American Agents.

This is No. 12 of the Cambridge Tracts referred to above, and has for its object the presentation and preservation of some of the most important discoveries of the great mathematician, Du Bois-Reymond. The author has attempted to bring the Infinitärcalcül up to date, giving explicit statements and careful proofs of some of the general theorems, "the truth of which Du Bois-Reymond seems to have tacitly assumed." F.

Practical Measurements. By A. W. Siddons, M. A., Mathematical Master at Harrow School, Late Fellow of Jesus College, Cambridge, and A. Vassals, M. A., Senior Science Master at Harrow School. 8vo, board cover. xv+60 pages. Price, 45 Cents. Cambridge, Eng.: The University Press. G. P. Putnam's Sons, New York, American Agents.

This book is an attempt, we are told, to arrange a course of weighing and measuring to further the closer relationship between mathematical and science teaching. To this end a course of experiments has been so arranged that the boy will gain a clearer idea about many points which were somewhat obscure when met with in the mathematical lessons. When time can be secured the course will certainly prove to be of great value to students. F.

Elèments de Calcul Vectoriel, Avec de Nombreuses Applications, A La Géomètrie, A La Mècanique, et A La Physique Mathèmatique. Par C. Burali-Forti, Professeur a L'Acadèmie Militaire de Turin et R. Marcolongo, Professeur de Mecanique Rationnelle a L'Universitè de Naples. Traduit de L'Italien par S. Lattès Maitre de Conferences a L'Universitè de Montpellier. 8vo, paper cover. vii+229 pages. Prix, 8f=$1.60. Paris, France: A. Hermann et Fils.

This work develops the principles of Vector Analysis and applies them in the second part of book to the solution of problems in Differential Geometry, Mechanics and Mathematical Physics. F.

The Imaginary in Geometry. By Ellery W. Davis, Lincoln, Nebraska. Paper cover. 58 pages. Reprinted from the University Studies, Lincoln, Nebraska. Vol. x, No. 1. January, 1910.

A paper of much interest and value. F.

A Short Table of Integrals. By B. O. Pierce, Hollis Professor of Mathematics and Natural Philosophy in Harvard University. Second Revised Edition. 8vo, cloth. 144 pages. Price, $1.50. Boston and Chicago: Ginn & Co.

This excellent little volume has been made even more useful by this revised edition, in which the author has added a few more formulas, e. g., pages 15, 30, 61, 110, and 111, and also a table of natural logarithms of all numbers of three digits between 1 and 5, and of all numbers of two digits between 5 and 10. F.

Anharmonic Coördinates. By Lieut.-Colonel Henry W. L. Hime, (Late) Royal Artillery, (author of Outlines of Quaterions, etc.). 8vo, cloth. xiv+ 127 pages. Price, $3.00. New York and London: Longmans, Green & Co.

Since no work had been written on the subject of which this work treats, and since only brief references are given by several authors on Quaternions, and none at all by writers on ordinary coördinate Geometry, the author felt that an invention by so great a mathematician as Sir W. R. Hamilton should not be allowed to be forgotten. The method is applied to the well-known geometrical theorems of conics including their special forms. The book is well written and the treatment quite lucid. F.

The Former Rates of the Earth's Rotation and Their Bearings on its Deformation, and the Bearings of Molecular Activity on Spontaneous Fission in Gaseous Spheroids. By Thomas Chrowder Chamberlain, Professor of Geology, University of Chicago. Extraction from Publication 107 of the Carnegie Institution of Washington. 8vo, paper cover. 59 pages+5 pages.

These two articles, which are very important contributions to cosmogony, constituted a part of Professor Chamberlain's argument in support of his planetesimal theory of the solar system, a theory which seems to be quite generally admitted to supercede the Laplacian, or Nebular Hypothesis. In the first paper, the author arrives at the conclusion,

(a) the frictional value of the water-tides have only a negligible effect on the earth's rotation; (b) that the tides of lithosphere are chiefly elastic strains and have little retardative value, while the tides of the atmosphere are too small to be measured; and (c), that geological evidences indicate that there has been no such change in the rate of the earth's rotation during its known history as to require it to be seriously considered in the study of the earth's deformations. F.

Elements of Plane and Spherical Trigonometry. By David A. Rothrock, Ph. D., Professor of Mathematics, Indiana University, Bloomington, Indiana. 8vo, cloth. xi+147 pages +99 pages of Tables. New York: The Macmillan Co.

The author has endeavored to prepare a text, which would serve as a basis for fifty or sixty-hour courses. Emphasis is placed upon drill work in trigonometric identities, and attention is given to trigonometric applications to practical problems, and approximate calculations. Chapter IX discusses briefly the theory of analytical trigonometry.

F.

ERRATA.

August-September number, p. 170, line 14, should read:

$$\frac{1}{a+\frac{1}{a}}+\frac{1}{\left(a+\frac{1}{a}\right)\left(a^2+\frac{1}{a^2}\right)}+,..=\left(a-\frac{1}{a}\right)\left[\;\dots\;\right]$$

P. 171, line 8, denominator of last term of series should be

$$\frac{1}{16.254.64514}$$

i. e. the third factor 645 should be omitted.